

What is claimed is:

1. A structure comprising:
a device that emits an optical signal from a top face of the device;
a sub-mount containing electrical traces that are electrically connected to the device;
and
a cap attached to the sub-mount so as to form a cavity enclosing the device, wherein the cap includes an optical element in a path of the optical signal.
2. The structure of claim 1, wherein the sub-mount further comprises:
internal bonding pads that are within the cavity and connected to the device; and
external terminals that electrically connect to the internal bonding pads and are accessible outside the cavity.
3. The structure of claim 1, wherein bonding of the cap to the sub-mount hermetically seals the cavity.
4. The structure of claim 1, wherein the cap comprises:
a spacer ring attached to the sub-mount; and
a plate attached to the spacer ring.
5. The structure of claim 4, wherein the optical element is formed on the plate.
6. The structure of claim 4, wherein the spacer ring comprises a silicon substrate having a hole formed therethrough.
7. The structure of claim 6, wherein the plate comprises a glass plate.
8. The structure of claim 4, wherein the plate comprises a glass plate.
9. The structure of claim 1, further comprising a post attached to the cap where the optical signal emerges from the cap.

10. A packaging method comprising:

electrically connecting a plurality of devices respectively to a plurality of sub-mount areas of a first wafer, wherein each device emits an optical signal from a top surface of the device;

fabricating a plurality of caps, each cap including a spacer having a hole therethrough, a plate that is transparent to the optical signals, and an optical element;

bonding the caps to the first wafer, wherein the devices are enclosed in respective cavities between the first wafer and the respective caps, and for each of the devices, the optical element in the corresponding cap is positioned to receive the optical signal from the device; and

dividing the first wafer to separate a plurality of packages containing the devices.

11. The method of claim 10, wherein the caps comprise respective areas of a second wafer, and bonding the caps to the first wafer comprises bonding the second wafer to the first wafer.

12. The method of claim 10, wherein fabricating the caps comprises:

forming an etch stop layer top surface on a substrate;

forming a plurality of optical elements overlying the etch stop layer; and

forming holes through the substrate respectively beneath the optical elements.

13. The method of claim 12, wherein forming the holes comprises etching a back surface of the substrate.

14. The method of claim 12, further comprising attaching a transparent plate overlying the optical elements.

15. The method of claim 12, wherein the substrate is made of a semiconductor.